

We claim:

1. A system for performing thermal cautery comprising:

at least one thermal cautery device, wherein each of the at least one thermal cautery devices comprises a resistive heating element; and

a power supply capable of providing power to the at least one thermal cautery device, wherein the power supply further comprises a means for identifying a thermal cautery device, said means for identifying a thermal cautery device capable of identifying which of the at least one of the thermal cautery devices are electrically connected to the power supply, and wherein each of the at least one thermal cautery devices are designed to operate with the power supply.

2. The system of claim 1 further comprising a control system capable of controlling power to the at least one thermal cautery device, wherein the control system provides power to a particular thermal cautery device only if the means for identifying a thermal cautery device identifies the particular thermal cautery device.

3. A system for performing thermal cautery comprising:

at least one thermal cautery device, wherein each of the at least one thermal cautery devices comprises a resistive heating element; and

a power supply capable of providing power to the at least one thermal cautery device, wherein the power supply further comprises a means for identifying a thermal cautery device, said means for identifying a thermal

cautery device being capable of identifying which of the at least one of the thermal cautery devices are electrically connected to the power supply, and wherein the means for identifying a thermal cautery device is further capable of determining whether a thermal cautery device electrically connected to the power supply is designed to operate with the power supply.

4. The system of claim 3 further comprising a control system capable of controlling power to the at least one thermal cautery device, wherein the control system provides power to a particular thermal cautery device only if the means for identifying a thermal cautery device identifies the particular thermal cautery device.

5. A system for performing thermal cautery on body tissue, said system comprising:

a thermal cautery device, said thermal cautery device comprising a resistive heating element mounted on means for pressing the resistive heating element into contact with body tissue;

a switching power supply; and

a control system comprising a means for operably connecting the switching power supply to the resistive heating element to provide power to the resistive heating element.

6. The system of claim 5 wherein the thermal cautery device further comprises an identifying electrical component having a predetermined value and the control system further comprises a means for identifying the thermal cautery device based on the identifying electrical component.

7. The system of claim 6 wherein the control system provides power to the thermal cautery device only if the means for identifying a thermal cautery device identifies the thermal cautery device.

5 8. The system of claim 6 wherein the identifying electrical component is a resistor.

9. The electrical circuit of claim 8 wherein the resistor is chosen from the group consisting of about  $1K\Omega$ , about  $10K\Omega$  and about  $51K\Omega$ .

10 10. The system of claim 5 further comprising a means for identifying the thermal cautery device connected to the switching power supply, wherein the control system controls operation of the thermal cautery device based on the identity of the thermal cautery device.

15 11. The system of claim 10 wherein the means for identifying the thermal cautery device comprises:

an identification resistor electrically connected to the thermal cautery device, said identification resistor having a pre-determined resistance value;

20 a reference resistor placed in series with the identification resistor when the thermal cautery device is electrically connected to the switching power supply, said reference resistor also electrically connected to ground such that an identifying voltage develops across  
25 the reference resistor when power is applied to the reference resistor and the identification resistor;

a comparison resistor electrically connected to the switching power supply and to ground, wherein a reference

voltage develops across the comparison resistor when power is applied to the comparison resistor;

a comparator, wherein the positive terminal of the comparator is electrically connected to the identifying voltage and the negative terminal of the comparator is electrically connected to the reference voltage;

wherein the comparator produces an output signal if the identifying voltage is higher than the reference voltage, said output signal indicating that a particular thermal cautery device is operably connected to the power supply.

12. The system of claim 11 further comprising a capacitor placed in parallel with the reference resistor.

13. The system of claim 11 wherein the identification resistor is chosen from the group consisting of about  $1\text{K}\Omega$ , about  $10\text{K}\Omega$  and about  $51\text{K}\Omega$ .

14. A system for performing thermal cautery, said system comprising:

a thermal cautery device, said thermal cautery device comprising a resistive heating element mounted on means for pressing the resistive heating element into contact with body tissue;

a means for providing a constant current; and

a means for operably connecting the resistive heating element to the means for providing a constant current in order to provide a constant current to the resistive heating element when power is applied to the system.

15. The system of claim 14 wherein the means for providing a constant current comprises:

5 a power source, wherein the resistive heating element of the thermal cautery device is electrically connected to the power source and to the drain of a power MOSFET;

a sense resistor electrically connected to the source of the power MOSFET and to ground, wherein a sense voltage develops across the sense resistor when power is applied to the sense resistor;

10 an operational amplifier, wherein the output of the operational amplifier is electrically connected to the gate of the power MOSFET, wherein the negative terminal of the operational amplifier is electrically connected to the sense voltage, and wherein the positive terminal of  
15 the operational amplifier is electrically connected to a control voltage such that when power is applied to the system the circuit will adjust the current until the sense voltage equals the control voltage.

16. The system of claim 15 further comprising:

20 a control system operable to set the control voltage based on the input of a means for identifying the thermal cautery device.

17. The system of claim 16 wherein the control system provides power to the thermal cautery device only if the means for  
25 identifying a thermal cautery device identifies the thermal cautery device.

18. The system of claim 16 wherein the power source comprises a switching power supply.

19. The system of claim 16 wherein the means for identifying the thermal cautery device is based on an identifying electrical component.

20. The system of claim 19 wherein the identifying electrical  
5 component is a resistor.

21. The system of claim 20 wherein the resistor is chosen from the group consisting of about  $1K\Omega$ , about  $10K\Omega$  and about  $51K\Omega$ .

22. The system of claim 16 wherein the means for identifying the thermal cautery device comprises:

10 an identification resistor electrically connected to the thermal cautery device, wherein the identification resistor of the thermal cautery device comprises a pre-determined resistance value and is capable of receiving power from the switching power supply;

15 a reference resistor placed in series with the identification resistor when the thermal cautery device is electrically connected to the switching power supply, said reference resistor also electrically connected to ground such that an identifying voltage develops across  
20 the reference resistor when power is applied to the reference resistor and the identification resistor;

a comparison resistor electrically connected to the switching power supply and to ground, wherein a reference voltage develops across the comparison resistor when  
25 power is applied to the comparison resistor;

a comparator, wherein the positive terminal of the comparator is electrically connected to the identifying

voltage and the negative terminal of the comparator is electrically connected to the reference voltage;

wherein the comparator produces an output signal indicating the presence of a particular thermal cautery device when power is applied to the circuit if the identifying voltage is higher than the reference voltage;

wherein the comparator output comprises the control voltage.

23. The system of claim 22 further comprising a capacitor placed in parallel with the reference resistor.

24. The system of claim 22 wherein the identification resistor is chosen from the group consisting of about  $1K\Omega$ , about  $10K\Omega$  and about  $51K\Omega$ .

25. A power supply capable of identifying a thermal cautery device, the power supply comprising:

an AC to DC converter; and

a power board adapted to receive power from the AC to DC converter, said power board comprising a means for identifying which of a plurality of thermal cautery devices are electrically connected to the power supply, and wherein said plurality of thermal cautery devices are designed to operate with the power supply.

26. The power supply of claim 25 further comprising a control system capable of controlling power to the plurality of thermal cautery devices, wherein the control system provides power to a particular thermal cautery device only if the means for identifying a thermal cautery device identifies the particular thermal cautery device.

27. The power supply of claim 25 wherein the means for identifying the thermal cautery device has an output, and wherein the power supply further comprises a means for generating a control voltage, said means for generating a control voltage adapted to receive the output of the means for identifying the thermal cautery device, and wherein the means for generating a control voltage is capable of outputting a control voltage that is unique to the thermal cautery device.

28. The power supply of claim 27 further comprising an interface board electrically connected to the power board, said interface board having switches and said switches having an output, wherein the output of the switches is capable of controlling the power provided to the thermal cautery device.

29. A power supply capable of identifying a thermal cautery device, the power supply comprising:

an AC to DC converter;

a power board adapted to receive power from the AC to DC converter, said power board comprising a means for identifying a thermal cautery device, wherein said means is capable of identifying which of a plurality of thermal cautery devices is electrically connected to the power supply;

wherein the means for identifying a thermal cautery device is further capable of determining whether a particular thermal cautery device electrically connected to the power supply is designed to operate with the power supply.

30. The power supply of claim 29 further comprising a control system capable of controlling power to the plurality of thermal



cautery devices, wherein the control system provides power to a particular thermal cautery device only if the means for identifying a thermal cautery device identifies the particular thermal cautery device.

- 5 31. An electrical circuit capable of identifying a thermal cautery device, said electrical circuit comprising:

a power source;

an identification resistor disposed in the plug of the thermal cautery device, said identification resistor  
10 capable of receiving power from the power source;

a reference resistor placed in series with the identification resistor, and electrically connected to ground, such that an identifying voltage develops across the reference resistor when power is applied to the  
15 electrical circuit;

a comparison resistor electrically connected to the power source and to ground, wherein a reference voltage develops across the comparison resistor when power is applied to the electrical circuit;

20 a comparator, wherein a positive terminal of the comparator is electrically connected to the identifying voltage and the negative terminal of the comparator is electrically connected to the reference voltage;

wherein the comparator produces an output signal when power  
25 is applied to the circuit if the identifying voltage is higher than the reference voltage.

32. The electrical circuit of claim 31 further comprising a control system capable of controlling power to the thermal

cautery device, wherein the control system provides power to the thermal cautery device only if the means for identifying a thermal cautery device identifies the thermal cautery device.

33. An electrical circuit capable of identifying a thermal  
5 cautery device, said electrical circuit comprising:

a power source;

an identification resistor operably connected to the thermal cautery device, said identification resistor capable of receiving power from the power source;

10 a reference resistor placed in series with the identification resistor, and electrically connected to ground, such that an identifying voltage develops across the reference resistor when power is applied to the electrical circuit;

15 a comparison resistor electrically connected to the power source and to ground, wherein a reference voltage develops across the comparison resistor when power is applied to the electrical circuit;

20 a comparator, wherein a positive terminal of the comparator is electrically connected to the identifying voltage and the negative terminal of the comparator is electrically connected to the reference voltage;

wherein the comparator produces an output signal when power is applied to the circuit if the identifying voltage is  
25 higher than the reference voltage.

34. The electrical circuit of claim 33 further comprising a control system capable of controlling power to the thermal cautery device, wherein the control system provides power to the

thermal cautery device only if the means for identifying a thermal cautery device identifies the thermal cautery device.

35. The electrical circuit of claim 34 further comprising a capacitor placed in parallel with the reference resistor.

5 36. The electrical circuit of claim 35 wherein the identification resistor is chosen from the group consisting of about  $1K\Omega$ , about  $10K\Omega$  and about  $51K\Omega$ .

37. An electrical circuit capable of identifying one of a plurality of thermal cautery devices, said electrical circuit  
10 comprising:

a power source;

a particular identification resistor disposed in the plug of each of the plurality of thermal cautery devices, wherein the identification resistor of one thermal  
15 cautery device has a distinct resistance from the identification resistor of all of the other thermal cautery devices, and wherein each identification resistor is capable of receiving power from the power source;

a reference resistor placed in series with the  
20 identification resistor of a particular thermal cautery device, and electrically connected to ground, such that an identifying voltage develops across the reference resistor when power is applied to the electrical circuit;

a resistor ladder comprising a plurality of comparison  
25 resistors, said resistor ladder electrically connected to the power source and to ground, wherein a corresponding plurality of reference voltages develops across the

resistor ladder when power is applied to the electrical circuit;

5 a plurality of comparators, wherein the positive terminal of each of the plurality comparators is electrically connected to the identifying voltage and the negative terminal of each of the plurality of comparators is electrically connected to a corresponding reference voltage when power is applied to the circuit;

10 wherein each of the plurality of comparators produces an output signal when power is applied to the circuit if the identifying voltage is higher than the corresponding reference voltage.

38. The system of claim 37 further comprising a control system capable of controlling power to the plurality of thermal cautery  
15 devices, wherein the control system provides power to a particular thermal cautery device only if the means for identifying a thermal cautery device identifies the particular thermal cautery device.

39. The electrical circuit of claim 37 wherein the plurality of  
20 thermal cautery devices comprises three thermal cautery devices and wherein the individual identification resistor of the three thermal cautery devices have values of about  $1K\Omega$ , about  $10K\Omega$  and about  $51K\Omega$  respectively.

40. The electrical circuit of claim 37 further comprising a  
25 capacitor placed in parallel with the reference resistor.

41. A device identification circuit capable of providing a constant current only to a specific thermal cautery device, said device identification circuit comprising:

a power source;

a resistive element electrically connected to the thermal cautery device, said resistive element also electrically connected to the power source and to the drain of a power MOSFET;

a sense resistor electrically connected to the source of the power MOSFET and to ground, wherein a sense voltage develops across the sense resistor when power is applied to the circuit;

an operational amplifier, wherein the output of the operational amplifier is electrically connected to the gate of the power MOSFET, wherein the negative terminal of the operational amplifier is electrically connected to the sense voltage when power is applied to the circuit, and wherein the positive terminal of the operational amplifier is electrically connected to a control voltage when power is applied to the circuit such that the circuit is capable of adjusting the current until the sense voltage equals the control voltage;

wherein the control voltage is dependent on the output of a means for identifying a thermal cautery device.

42. The device identification circuit of claim 41 further comprising a control system capable of controlling power to the thermal cautery device, wherein the control system provides power to the thermal cautery device only if the means for identifying a thermal cautery device identifies the thermal cautery device.

43. An electrical circuit capable of identifying one of a plurality of thermal cautery devices and also providing a

constant current to at least one of the plurality of thermal cautery devices, said electrical circuit comprising:

a power source;

5 a particular identification resistor electrically connected to each of the plurality of thermal cautery devices, wherein a identification resistor of one thermal cautery device has a distinct resistance from the identification resistor of all of the other thermal cautery devices, and wherein each identification resistor is capable of  
10 receiving power from the power source;

a reference resistor placed in series with the identification resistor of a particular thermal cautery device, and electrically connected to ground, such that an identifying voltage develops across the reference  
15 resistor when power is applied to the electrical circuit;

a resistor ladder comprising a plurality of comparison resistors, said resistor ladder electrically connected to the power source and to ground, wherein a corresponding plurality of reference voltages develops across the  
20 resistor ladder when power is applied to the electrical circuit;

a plurality of comparators, wherein the positive terminal of all of the plurality comparators is electrically connected to the identifying voltage and the negative  
25 terminal of each of the plurality of comparators is electrically connected to one corresponding reference voltage when power is applied to the system;

wherein each of the plurality of comparators is capable of producing an output signal if the identifying voltage is

higher than the corresponding reference voltage, and wherein the set of outputs of the plurality of comparators is capable of identifying which of the plurality of thermal cautery devices is plugged into the circuit;

at least one resistive heating element electrically connected to each of the plurality of thermal cautery devices, said at least one resistive heating element electrically connected to the source of electrical power and to the drain of a power MOSFET;

a sense resistor electrically connected to the source of the power MOSFET and to ground, wherein a sense voltage develops across the sense resistor when power is applied to the circuit;

an operational amplifier, wherein the output of the operational amplifier is electrically connected to the gate of the power MOSFET, wherein the negative terminal of the operational amplifier is electrically connected to the sense voltage, and wherein the positive terminal of the operational amplifier is electrically connected to a control voltage such that the circuit is capable of adjusting the current through the at least one resistive heating element until the sense voltage equals the control voltage;

wherein the control voltage is dependent on the set of outputs of the plurality of comparators.

44. The system of claim 43 further comprising a control system capable of controlling power to the plurality of thermal cautery devices, wherein the control system provides power to the

particular thermal cautery device only if the means for identifying a thermal cautery device identifies the particular thermal cautery device.